NCEP Regional Reanalysis, Report on work done in Fiscal Year 2003

This is a summary report on the work done on the Office of Global Programs' Regional Reanalysis (RR) Project in Fiscal Year 2003 (FY03). Given that during FY03 and immediately thereafter, several comprehensive reports and/or conference papers were prepared on the RR work done (all submitted to the OGP or sent to responsible OGP program officers) this report will be brief, as it can take advantage of the documentation already available.

Since work plans called for the main RR production effort to start in late spring or summer 2003, the regular once-a-year meeting of the RR Scientific Advisory Committee (RRSAC) was scheduled for late spring in FY03 (16 May 2003). RRSAC was thus able to offer timely advice taking advantage of the latest material available just prior to the planned onset of production. With still numerous issues and concerns to be resolved, RRSAC gave recommendations regarding input data, production, output, and outreach (which includes archiving and user community involvement). A comprehensive report on issues discussed at this meeting, and resulting RRSAC recommendations, was submitted to the OGP and is available upon request.

It was only when all of the computing resources of the previously operational NCEP IBM ASP mainframe system became available to the RR, that the remaining necessary tests could be completed and full production (in four simultaneous streams) undertaken. The tests referred to here included development of a smooth transition of the precipitation assimilation scheme from the assimilation of analyzed precipitation to model produced precipitation, and identification of a previously unknown detrimental component of surface data, which was found to be 2 m land surface temperatures, that had to be excluded from input data for satisfactory performance. A favorable by-product of the latter is availability of an independent dataset that can be used for verification purposes.

A massive data production effort took place during three and a half months of summer and early fall, with about 70 Tb of the RR data produced and moved to the NCEP's High Performance Storage System (HPSS). This production effort was of possibly an unprecedented magnitude. About 24 years of the RR data were generated, the years 1979-2002. The 2002 data were subsequently discovered (acknowledgment: Hugo Berbery) to have a problem with the Mexican precipitation data inadvertently having been set to zero. As a result, this year has been rerun in FY2004.

Some monitoring took place during the production phase but the extraordinary production speed left few person power resources for the monitoring and verification work. Verification and preparations for data archiving efforts became the main project activity near the end of FY03, eventually leading to three conference papers: an overall RR summary paper (Mesinger et al. 2004), a data input review paper (Shafran et al. 2004), and a data archiving and extraction system paper (Ebisuzaki et al. 2004). The three papers were submitted to the AMS Annual Meeting, Seattle, January 2004, and thus were available to the potential RR user community in November 2003.

The quality of the RR data produced lived up to and probably well exceeded the expectations of the community; just about all of the various fields looked at were found to be significantly more accurate than similar North American climate products (Mesinger at al. 2004). One exception to this is the recently discovered (acknowledgment: CPC) excessive strength of the summer low level jet over the Gulf of California in the reanalysis

fields (even more so in the first guess), unfortunately just in the area that is now the focus of the various NAME activities. The reasons for this problem are presently being investigated.

Considerable work remains in FY04 to set up a near-real time RR system (R-CDAS) which will be applied to production of the RR 2003 data. Some of the data components have to be changed (and to a degree redesigned) for real-time input. Data archiving at several outside archiving centers and outreach to the user community are also efforts of considerable magnitude. These two outstanding tasks are described in the Proposed RR work plan for FY04 (submitted separately).

All of the papers referred to, the RR data inventory document and 24 years of four-panel RR plots, have been made available to the community on a CD entitled "North American Regional Reanalysis – 24 Years of Weather". The CD contains a revised overview paper dated December 31, 2003. The CD has been widely distributed and essentially all of the 1000 copies printed have gone into the hands of interested people. It contains a comprehensive report on the RR work done and data produced, up to the end of calendar year 2004. The CD has been sent to the responsible OGP program officers and a limited number of additional copies are available upon request.

References

Ebisuzaki, W, J. Alpert, J. Wang, D. Jovic, P. Shafran, 2004: North American Regional Reanalysis: End user access to large data sets. *20th International Conf. on Interactive Information and Processing Systems (IIPS) for Meteorology, Oceanography and Hydrology*. Combined Preprints CD-ROM, 84th AMS Annual Meeting, Seattle, WA.

Mesinger, F., G. DiMego, E. Kalnay, P. Shafran, W. Ebisuzaki, D. Jovic, J. Woollen, K. Mitchell, E. Rogers, M. Ek, Y. Fan, R. Grumbine, W. Higgins, H. Li, Y. Lin, G. Manikin, D. Parrish, and W. Shi, 2004: North American Regional Reanalysis. *15th Symp. on Global Change and Climate Variations*, paper P1.1, Combined Preprints CD-ROM, 84th AMS Annual Meeting, Seattle, WA.

Shafran, Perry, J. Woollen, W. Ebisuzaki, W. Shi, Y. Fan, R. Grumbine, and M. Fennessy, 2004: Observational data used for assimilation in the NCEP North American Regional Reanalysis. *14th Conf. on Applied Climatology*. Combined Preprints CD-ROM, 84th AMS Annual Meeting, Seattle, WA.

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